Study Guides: Effective Tools to Improve Self-Directed Learning Skills of Medical Students

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Abstract- In medicine, there is a rapid development of a knowledge base. Medical professionals need to sustain and advance their competence to practice in response to these varieties. So, there is increased interest in self-directed learning methods. Study guides can make a major contribution to self-directed learning. This study was carried out to evaluate the effect of study guides on improving self-learning skills of medical students in the Iran University of Medical Sciences (IUMS). In this quasi-experimental study, 46 medical students were randomly assigned into two groups; the intervention group and the control group. Both groups participated in a diagnostic test at the beginning of the course (pre-test). The same test was taken at the end of the course (post-test). The intervention group was provided with study guides on thyroid disorders and diabetes. Meanwhile, they continued their routine clinical training. The control group was only involved in the conventional training program. Students in the intervention group were also asked to complete a designed questionnaire in regard to their attitude toward the study guides. At enrollment, there was no statistically significant difference between the two groups. The mean scores of the pre-test for the control group and the intervention group were 6.18 and 6.13 respectively (P=0.9). In the post-test, the mean score of the students in the intervention group was considerably higher: 9.25 vs. 12 (P=0.002). The students in the intervention group found the study guides useful. The study guides were potentially effective in motivating self-learning in this group of medical students and had a remarkable effect on their final score.

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Introduction

Learning is a process of active engagement with experiences. Effective learning will lead to personal and professional development and a desire to learn more. In a constantly changing environment, medical students, as adult learners are responsible for their learning not only for survival, but also for further development (1,2).

Medical professionals need to sustain and advance their competence to practice in response to changing needs of patients, organizations and society (3,4). They should develop learning of scientific knowledge, clinical expertise and problem solving skills. Since the delivery of evidence-based medicine, problem solving, and critical thinking has become an integrated part of medical curricula (5,6). Through the process of self-directed learning, physicians will be more successful at improving clinical outcomes.

To be a self-directed learner, medical students need effective tools that promote their critical thinking skills. Study guides can make a major contribution to self-directed learning. Study guides assist students to interact with various components of the curriculum (7). Unlike textbooks which emphasize solely on the content, the main purpose of the study guides is facilitation of learning by providing core information, determining and organizing learning activities and managing students' learning on the subject or topic of study (8-10). It seems that study guide can improve students' ability to

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assimilate and synthesize medical information and reinforce their self-learning skills (11). Therefore, this study was conducted to evaluate the effect of study guides on improving self-learning skills of medical students during their clinical endocrinology rotation.

Materials and Methods

This research was a quasi-experimental study which included 46 undergraduate medical students in their 4th academic year. They were scheduled to clinical endocrinology course, as a part of their clinical training program. The participants were randomly assigned into two groups. The control group consisted of 22 students (those who continued their routine clinical training) and the intervention group (those who were provided with the guides at the beginning of the course) was included 24 students. The academic curriculum, course program and recommended references were all provided and explained to the participants at the beginning of the course. After the completion of the courses both groups were asked to complete a designed questionnaire in order to assess their attitudes towards clinical endocrinology course. Also, all of the students took the exam at the beginning (pre-test) and the end of the course (post-test). Neither students nor teachers were aware of the implementing strategy. The exam papers were reviewed and scored by an expert blinded to the study groups. To prevent contamination between groups, students who participated in the course earlier, were determined as a control group.

Study guides

Study guides on thyroid disorders and diabetes were designed according to the problem-based learning strategy. Topics covered in the guides included diagnosis, complication, and management of hypothyroidism, hyperthyroidism, and diabetes. The contents of the study guides were categorized into seven parts; i.e. introduction, expected background knowledge, targets, self-assessment tests, core information, dummy tables and tutor answers. The study guides on diabetes covered 17 learning outcomes and the guide on thyroid disorders had 8 targets. The former comprised three case scenarios on diagnosis, management and complications of diabetes while the latter consisted of case scenarios on hyperthyroidism and hypothyroidism. Dummy tables were designed to motivate students' clinical decision-making skills according to the case scenarios. In this part, the students were asked to rank key points in history and physical findings described in the case scenarios and to discuss the reasons for selecting these points as important features of the case scenario. They were also asked to design their diagnostic scheme, select appropriate lab tests and discuss the most suitable treatment plan. At the end of the guides suggested tutor answers had been provided for students in order to compare their scheme with those provided by an expert in the field. The self-assessment section was designed to uncover background knowledge and motivated the students to go through references in order to solve the problem.

Questionnaire

The questionnaire was designed to evaluate students' attitudes toward the study guides. It was designed based on topics identified in the literature. The questionnaire was composed of 12 items. The questionnaire constituted the viewpoints of the learners about the effectiveness of the guides on their promotion, the application of them in future clinical rotations, willingness to be trained using these guides, and need for using similar study guides for their peers. In addition, some questions were added regarding demographic information including age, sex, marital status and accommodation status. To establish the content and face validity of the questionnaire, three faculty members were asked to evaluate the questionnaire. They commented on any item that they found ambiguous or difficult to understand.

Exam

A diagnostic test (pre-test) was prepared to assess students' knowledge on the topics covered in the guides. It constituted case scenarios on diabetes and thyroid disorders and seven essay questions matched to the academic level of the learners. Both the intervention and control groups participated in a test at the beginning of the course. The same exam (post-test) was taken from both groups at the end of the training program. Meanwhile, all of the students took the final exam at the end of the course as predicted in the program. Twenty multiple choice questions were included in this exam, according to the learning objectives listed in the undergraduate curriculum.

Results

Demographic characteristics of the participants

There was no statistically significant difference between intervention and control groups regarding age, gender, marital status or accommodation. Demographic

data of the participants are shown in table 1.

Table 1. Demographic characteristics of participants

Variable	With Intervention	Without Intervention	*P*.value
	Number (%)	Number (%)	
Gender			
Female	13 (61%)	19 (82%)	0.124
Male	8 (39%)	4 (18%)	
Marital status			
Single	19 (90%)	22 (95%)	0.496
Married	2 (10%)	1 (5%)	
Accommodation Status			
Local	12 (57%)	14 (60%)	0.802
Dormitory	9 (43%)	9 (40%)	
Age (years)			
Mean (±SD)	23.04 (±1.11)	23.43 (±0.98)	0.084

Students' performance

The students' scientific background was the same and their mean scores in basic sciences and physiopathology examinations did not show any significant difference between the two groups: mean difference of 5.45 (*P*=0.33) and 0.23 (*P*=0.55) respectively. The mean scores of the pre-test for the control group and the intervention group were 6.18 and 6.13 respectively (*P*=0.9). In the post-test, the mean score of the students in the intervention group was considerably higher: 9.25 vs. 12 (*P*=0.002). In table 2 students' scores in the pre and post tests and the effect size of the intervention are shown.

Table 2. Comparison between pre-test and post-test scores in two groups

Test	Without intervention Mean(±SD)	With intervention Mean(±SD)	Mean Difference	Std. Error Difference	CI	*P*.value
Pre-test (score)	6.18(± 2.09)	6.13(±1.81)	0.055	[0.54	1.15 - 1.04	0.919
Post-test (score)	9.25(± 3.10)	12(±2.61)	2.75	0.85	1.04 - 4.46	0.002*
Effect size	3.07(±2.79)	5.87(±2.54)	2.80	0.78	4.40 –1.21	0.001*

Students' perception

Students' attitudes toward the study guides were evaluated in this study. We also analyzed students' opinions about the efficiency of the study guides as well as their opinion on using similar such study guides in the future. Nine percent of the intervention group did not complete the study guides. Fifty-four percent of them went through the guides and did the expected tasks completely. Also, nine percent of the intervention group completed less than 25% of the contents. One of them did not answer the questions and two students did not complete the study.

After excluding these students, 32% of students in the intervention group believed that the study guides had a profound effect on their learning skills, 42% evaluated the effect as moderate. More than 50% of participants in the intervention group reported that they would like to use similar study guides in the future and 60% of them stated that they would recommend the use of such study guides to their peers.

Discussion

This study explores the effects of study guides on perceptions and self -learning skills of medical students during their undergraduate clinical training program in Iran. Medical students are expected to be lifelong learners and keep their knowledge up to date. Therefore, they should learn to renew their information and be able to keep up with the vast changes that take place on an everyday basis (5,6). Many studies focus on methods that improve learning skills. Suggs *et al*. (1998) showed that "self-learning tools" might be considered as an alternative to the current traditional training approach (12). This study is shown the effects of study guides on improving self-learning skills of medical students and their positive perception toward the guides that facilitate and manage their learning activities.

Students' performance

In our study, students who used the study guides had a better performance at the end of the course, therefore,

study guides proved to be efficient in enhancing learning skills of the participants.

This study produced results that corroborate the findings of the previous work in this field. Yalcin *et al*., examined the effect of problem-based learning on students' self-directed learning skills. They concluded that students' scientific thinking and problem solving, improved using a problem-based approach in comparison to conventional teaching methods (13). Likewise, Considine *et al*., showed that a written self-directed learning package was effective in increasing students' knowledge of nursing students (14). Similar findings reported by Tippett (2004) in regard to the effectiveness of a written manual on the test scores of participants (15). In addition, the results of Bird & Wallis study indicated that students who provided with a self-learning package had higher knowledge scores compared to their control peers (16).

In another study, the effect of study guides on student performance was examined in introductory psychology (10). The authors showed a significant and statistically significant difference between those who were provided with study guides and those in the control group. However, there was no difference between those who completed more than 75% of the guides with those who completed less than 25%.

It can be argued that this difference could be attributed to the varying academic backgrounds of the participants. In our study, the students had comparable and similar average scores in their basic sciences as well as pathophysiology examinations. Meanwhile, all of the participants participated in a diagnostic test at the beginning of the course and there was no significant difference between the average score of the students; therefore, both groups seem to have comparable scientific backgrounds and were equally competent at the beginning of the course.

Parallel to our findings, in a study conducted by Considine *et al*., (2005) no significant difference in scores between the pre test exams scores was observed before the intervention (14). Findings from Hollier's study of students who were at different levels of training indicated that there was no significant effect of the study guide on the scores for the first-year residents. The authors concluded that it may be that the interns do not yet have adequate clinical experience or knowledge to find the study guide helpful or they may not have adequate time to use the study guide (11).

In our study was found an interesting result in relation to the final exam scores of the students, i.e. all participants got similar scores on the final exam that was an MCQ test. This may confirm that MCQ examination has limited power to evaluate higher cognitive functions and were more suitable to assess memorization and recall. This observation might lead to reconsideration in student assessment in our medical schools. On the other hand, the importance of students' motivation as a key element of active learning becomes more obvious when we look at our results which showed that nine percent of the students did not go through the guides and followed 25% of the expected activities provided in the guides.

Moreover, we observed the pre-test and post-test scores were low in both groups. This is likely to happen because of the test format. In our opinion, one reason may be that students use higher-order cognitive skills in essay- type test. Additionally, the lower scores in the essay questions may be attributed to more subjective marking. This finding is in agreement with Pepple's findings, which showed essay scores were significantly lower than MCQ scores (17). Furthermore, the present findings seem to be consistent with another research that found students tend to score higher generally on the MCQ exams compared with essay exams (18).

Students' perception

In regard to students' Perception, in our study the majority of the students showed a positive attitude toward the guides and believed that they had a role in promoting self-learning skills. These students were willing to recommend their peers to use similar guides. Khogali (2006) showed a positive attitude among students who provided with the study guides and find the tool effective in their learning process (19). In parallel to this finding, Dickson (2005) showed that participants had the will to use the study guides voluntarily (10). Although our results supported the effectiveness of the guides in this group of medical students; however, the most important limitation of this study was a small sample size.

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